

USAWC STRATEGY RESEARCH PROJECT

TRULY JOINT CONSTRUCTION ENGINEERS: THE TIME IS NOW

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ABSTRACT

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The U.S. military has four separate construction engineer organizations within the four services. Each service mans, equips, and trains their respective engineers differently. Although some of the training is consolidated at major installations for initial and advanced training, Soldiers, Airmen, Sailors, and Marines all prepare for and execute different mission sets using different equipment. Officers and enlisted, active duty and reserve component personnel from all services should train the same way and use the same equipment, instead of various commercial types. Additionally, the active component (AC) to reserve component (RC) force structure ratio of 24 percent AC to 76 percent RC is satisfactory in peacetime, but unacceptable during current operations. This SRP identifies opportunities to generate combat power and efficiencies in a combined construction engineer force structure using service members from all services and all components, using the same training facilities and equipment.

TRULY JOINT CONSTRUCTION ENGINEERS: THE TIME IS NOW

Early in 2001 upon becoming the Secretary of Defense for the second time, Donald Rumsfeld contended that the U.S. military remained stuck in a Cold War mentality, relying on large organizations of personnel and equipment. His ire was directed primarily at the Army because he felt it was too large and organizationally cumbersome. The former Chief of Staff of the Army, General Eric Shinseki had already initiated an innovative but controversial plan to transform the Army in his *Army Vision* speech on 12 October 1999 at the Association of the United States Army (AUSA) annual meeting. General Shinseki envisioned a more strategically deployable and mobile organization that could fight in all types of terrain using the new Stryker vehicle and fighting as an Interim Stryker Brigade Combat Team. General Shinseki reaffirmed his view of transformation at the Winter Symposium of AUSA in early 2000, noting that “most opportunities for change are forced by war as adjustments are made to battle formations, ...changing in peacetime, during a narrow window of opportunity, entails risk, but promises great rewards.”¹ Both men thus addressed an obvious need to retool the Army organization by making it lighter, more lethal and agile, and easily deployable. These strategic decisions will remain in the forefront of military discussions for a long time to come. But how should we improve the best military in the world by restructuring it for the 21st Century?

This SRP focuses on the construction engineering organizations within the U.S. military formations by analyzing the different structures in the four services, looking at the capabilities and designs in place today, and recommending changes that will transform this critical capability into a design relevant for this century. A review of the services’ construction engineering specialties including carpentry, plumbing, electrical technicians, heavy construction equipment operators, and engineer mechanics reveals numerous redundant personnel and architectures. To become more agile, mobile, and integrated, we must improve the overall organizations and position the current service organizational types to meld into a joint organization trained with the same Joint Doctrine, operating the same joint equipment sets, and serving in organizations identically built with the same number of engineers and equipment in each. The reserve component must standardize their organizations as well. This design will likely increase the number of standardized organizations and increase critical capabilities within state structures during peace or crisis. Standardizing unit design, learning and training in a joint environment using the same doctrine, using the same equipment, and increasing the number of active and reserve component units by using a standardized smaller structure will meet significant

resistance. But visionary leaders will see in this concept engineer organizations ready to meet today's and tomorrow's challenges.

Combining the four different construction engineer organizations currently in the military will generate a synergistic effect. Synergy is defined as "the interaction of two or more agents or forces so that their combined effect is greater than the sum of the individual effects."² Further, "by replacing independence with interdependence, organizations that are mutually dependent on each other's unique skills and capabilities are more inclined to try and attain a common, higher goal."³ Senior engineer senior leaders from the four services have a unique opportunity to combine the skills and capabilities within the current force structure and forge a better joint corps that can improve the engineering functional area and attain increased interdependence.

Currently the Army, Navy, Air Force, and Marine Corps all have construction engineers in their formations that are people- and equipment-heavy; unable, because of a lack of heavy transport vehicles in their organization, to move all of the heavy equipment at one time. They are all engaged in several similar operations. They do not conform to the projection, deployable design that both the former Secretary of Defense and Chief of Staff of the Army have envisioned. Analysis will show that with modernization, personnel restructure and training, the removal of cultural barriers inculcated within the services, and rebalancing the active component/reserve component, they can be vastly improved and perform in a new model. In April 2005 the current Chief of Staff of the Army, General Schoomaker, coined the phrase – "The Army Pentathlete"⁴ referring to the Army Soldier, a highly trained, adaptable, strong Soldier who can accomplish any mission, not just his particular specialty. We have an opportunity to transform the military construction engineer into an Engineer Pentathlete - a highly trained, adaptable, engineer equipped with joint knowledge, current equipment, serving in a standard "joint" unit design to expertly complete any engineer mission or task required of him.

Former Secretary of Defense Rumsfeld focused enormous energy on making the Defense Department see "jointness" as not only an idea, but a necessity. This was one of his top priorities. He envisioned jointness reaching the lowest levels, including conducting training and exercises in a joint mindset at all times. His vision for our nation's overall defense strategy began with achieving joint integration and transformation. He felt that "transformation results from exploitation of new approaches to operational concepts and capabilities, the use of old and new technologies, and new forms of organization that more effectively anticipate new or still emerging strategic and operational challenges and opportunities that render previous methods obsolete."⁵ He also recognized that the way we prepare to fight is the way we will fight. He

worked to transform the Defense Department by changing its current mindset of “bigger is better” to a joint mindset of “leaner, agile, adaptable, and tailororable organizations” with less redundancy. Secretary Rumsfeld stated in his FY2004 Defense Budget testimony to the House Armed Services Committee that “transforming is about more than developing new strategies and structures – it is about changing culture, encouraging new thinking, and developing new ways of fighting.”⁶ In Secretary of Defense Gates’ Swearing-In Remarks of 18 December 2006, he reiterated that “one of the President’s top priorities is to transform our military to become more agile, more lethal, and a more expeditionary force.”⁷ Therefore we can safely surmise that the new Secretary of Defense will continue to shape our future military forces in each service in the direction of joint actions to provide the variety of necessary capabilities of a modernized force that is lighter, adaptable, transformed, and fully integrated within the joint culture.

Only a few days before Secretary Gates’ Swearing-In, on the other side of the country Major General William McCoy, in charge of Iraq reconstruction, presented the keynote address to the December 2006 class at the Naval Post Graduate School. His comments focused on “achieving genuine inter-service and coalition interoperability...thinking critically and creatively about how to get out of the box. And although he was the Commander of the Army Corps of Engineers effort, his ability to bring together all four services for reconstruction in Iraq built a tremendous synergy and a truly joint effort.”⁸ Just as MG McCoy successfully integrated the four services at the tactical and operational levels in Iraq, the Department of Defense leadership has the same opportunity to achieve similar success at the institutional and strategic levels. To remain relevant, it is imperative that the engineering specialty become fully integrated in a common framework for engineer training, organizational design, and equipment procurement. This strategic shift of “purpling” the engineer community and building a joint engineer force will not be accomplished overnight, but it must start now to keep the engineer soldier at the pinnacle of the force – an essential enabler to the warfighter.

The engineer force structure today is considerably smaller than fifteen years ago, yet most engineers would strongly argue that requirements have increased. The total Army engineer structure of 83.9K soldiers in February 2007 is comprised of 20.4K (24%) in the active component, 43.2K (52%) in the Army National Guard, and 20.3K (24%) in the Army Reserve.⁹ The strain of five continuous years at war since the beginning of Operation Enduring Freedom (OEF) has stressed the Army’s active and reserve components to their limits. The Navy, Air Force, and Marine Corps are in the same predicament, and 60% of the Navy’s Seabees are in the reserves. All active and reserve component engineers have been mobilized at least once, and many are on their second and third deployments. The reserve component has served

magnificently, but until 12 January 2007,¹⁰ mobilization rules dictated that the reserve forces could be mobilized only for two years out of a five-year cycle for the same military operation, without a waiver approval by the Secretary of Defense. This change will enable new planning criteria considerations authorizing engineer reserve component soldiers to deploy to either Iraq or Afghanistan within the five-year time period. The other three services will be similarly affected, with the Navy facing the most significant challenge due to the number of reserve construction engineers in the Seabees.

We must anticipate more engineer operations and missions in Iraq and Afghanistan. Actually the missions and projects are transforming from the critical mobility, countermobility, and sustainment missions associated with an offensive military operation in late 2001 in Afghanistan and early 2003 in Iraq, to complex, multi-faceted projects rebuilding infrastructure in both countries today. Combat engineers in the Army and the USMC continue to conduct route clearance operations, demolitions, obstacle clearance, and bridging in support of offensive Iraqi operations in Anbar, Falluja, and Balad, but the preponderance of Army engineer work is currently in the form of construction engineering. These projects range from small local upgrades to large, complex urban designs affecting the lives of thousands of military personnel or Iraqi citizens. Examples include construction of coalition force facilities including command and control buildings, unit beddown areas, and maintenance facilities, along with construction of multi-thousand foot airstrips, heliports, and logistics bases.

The U.S. military has Soldiers, Sailors, Airman, and Marines serving with the military occupational specialty Engineer. There are a number of specialty areas in the engineering field to include combat engineering, general engineering, high power generation, bridging, diving, and topography. A highly trained Soldier should be equally adept at fulfilling all of the requirements that a Marine, Sailor, or Airman engineer specialist would ever face. The force pool should be interchangeable. It is not inconceivable that a future engineer would serve a career stationed at any number of Army, Navy, Marine, or Air Force bases. Getting to this point will require dismantling huge barriers once thought impenetrable or protected by service fiefdoms. The engineering community now requires innovative thinking, knowledge and training of technical skill sets, and standardization of equipment. The bottom line is to produce a highly trained engineer who has mastered a joint core curriculum of general construction skills, taught at a joint facility, served with a joint cadre, using the same equipment, to complete engineer construction tasks in support of the Army, Navy, Air Force, or USMC. To succeed, we must combine and centralize the training and procurement of equipment and institutionalize engineer doctrine for all services with general engineering specialties.

General Engineering (Construction Engineering)

In today's military engineer structure, the Army, Navy, Air Force, and Marine Corps each have construction engineering organizations unique to each service's culture and current mission sets that have evolved over the years. All four services have specialists in the active and reserve component. Over 68% of the general engineering construction military occupational specialty soldiers reside in the reserve component; only the USMC has more construction capability in the active component than in the reserve component.¹¹

Comparisons between the four services show a wide variation in the number of units available in the force structure and in personnel, equipment, and unit capabilities as of February 2006.¹² The Army's base structure is the Engineer Battalion, Combat Heavy. This organization is comprised of 650 enlisted and 35 officers assigned to one Headquarters and Support Company (HSC) and three identical line companies. The HSC Company includes the battalion leadership and staff, a robust organizational maintenance platoon, a Direct Support maintenance platoon that accomplishes depot level maintenance, and a heavy construction support platoon. The three line companies are organized with a company headquarters, two vertical construction platoons, and a horizontal construction platoon. The vertical construction platoon constructs buildings and other facilities, relying on carpenters, plumbers, and electricians, whereas the horizontal platoon does the vast array of earthmoving tasks to build roads, heliports, airfields, and basecamps; its heavy construction operators operate the dozers, graders, and scrapers. The Army has 40 battalions in the structure: 7 Active, 14 Army Reserve, and 19 Army National Guard. Each battalion has over 260 pieces of equipment, including dozers, dump trucks, road graders, scrapers, loaders, excavators, and cranes. These battalions can perform the full spectrum of horizontal engineering missions to include earthmoving, road, base camp, airfield, and bridging construction. Additionally, there are six vertical construction platoons per battalion that conduct facility construction and utilities development.

The Army also has a robust horizontal construction unit called the Combat Support Equipment Company (CSE), which carries 118 pieces of engineer equipment to perform horizontal construction missions requiring large earthmoving, debris removal, and road construction equipment. The company has 177 soldiers; there are six Active, three Reserve, and 17 Army National Guard CSE's. This company is usually assigned to a construction battalion or an engineer construction group for command and control and mission assignments.

The basic U.S. Navy construction unit is the Naval Mobile Construction Battalion (NMCB) with 8 Active and 12 Reserve battalions. The Seabees are organized like their Army

counterparts with 811 sailors (787 enlisted and 25 officer) using 264 pieces of engineer equipment and fulfilling the same capabilities. A recent interview with Navy Captain Mike Peek, Joint Staff J4, Engineer Division Chief in the Pentagon, informed me of the Navy's internal plan to increase the active NMCBs by one battalion and the reserves by one battalion by the summer of 2007.¹³ He also indicated that the current fill of 811 sailors in a NMBC has been reduced to ~645 because a reserve company, rarely available, had been removed from the current organization. These reserve sailors will fill many of the manning requirements for the two new NMBCs. Until current operations in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), the Seabees remained within 50 miles of the shore to remain connected to the Navy administration and support networks. The Chief of Naval Operations, Admiral Mullen, in his recent comments to the Army War College Class in December 2006, bluntly observed that the Navy works closely with the Army and USMC to take on requirements not traditionally sought. He noted that the Navy Seabees are relieving other services of certain requirements. The Seabees (affectionately known as "dirt sailors"¹⁴), using their specific construction engineer skills, are one of the Navy's contributions to the massive reconstruction and stabilization mission in Iraq.¹⁵

The U.S. Air Force basic construction organization is smaller, with 404 positions and 148 pieces of equipment. The Air Force has three Active, two Reserve, and two Air Guard construction squadrons. Air Force squadrons are approximately half as large as the Army's or the Navy's typical battalion. The Red Horse Squadrons conduct small-scale horizontal construction primarily focused on airfield repair and vertical construction with facilities repair and upgrade. The squadron conducts only light base development due to limited electrical, plumbing, and carpentry skilled airmen in the force structure. The Air Force focuses on expeditionary employment, so their equipment is a smaller version of the primary earthmoving equipment.

The USMC structure focuses predominately on combat engineering. However, they have four Engineer Support Battalions (ESB), with three in the Active and one in the Reserve Component. These large battalions of 1475 marines and sailors dwarf the other organizations in number of key pieces of equipment (442 pieces). Their construction capabilities are similar to the Army's and Navy's, but a large portion of the structure is focused on bulk fuel storage and distribution, bulk water production and distribution, and mobile electric power production. These specialized activities are accomplished outside of the engineer structure in the other three sister services, which skews comparisons of personnel and equipment.

With only 32 percent of the Army's construction engineer strength in the active component, the current conflicts in Iraq and Afghanistan have raised grave concerns about fulfilling mission requirements with a limited force pool due, especially in view of current mobilization rules affecting the National Guard and the Reserve. Each of the 40 Army construction battalions, every one of the Navy's Mobile Construction Battalions, and over 50 percent of the Air Force RED HORSE Squadrons and USMC Engineer Support Battalions have deployed to theater. Unlike the other services, the Army has an additional challenge when utilizing the National Guard. With 19 of 40 Army construction battalions and 17 of 26 Combat Support Equipment Companies (CSE) in the National Guard, the state governors are extremely reluctant to relinquish control of these critical assets since they provide emergency response and assure preparedness within their states throughout the year. Construction engineers are highly coveted, especially during severe inclement weather or natural disasters, existent in the states of Alabama, Mississippi, Louisiana, and Texas in the aftermath of Hurricanes Katrina and Rita. Construction engineers' equipment and soldier expertise are force multipliers in these situations; they quickly establish the credibility of the local government when mobilized to work in devastated areas. In the spring of 2006, during heightened tensions after Hurricane Katrina, Governor Blanco of Louisiana disapproved of deployments of Louisiana Army National Guard construction battalions to either Iraq or Afghanistan. The Defense Department was then required to seek alternate sources.

The current organizational design of personnel and equipment for construction engineers in the four services is vastly different. These differences pose significant issues for strategic leaders to identify the appropriate forces needed to fulfill requirements in Iraq and Afghanistan. With a standardized unit organization, strategic decisions for employment will be simplified and force planners will know what a typical construction organization will provide in both personnel and equipment. After a standardized design has been accepted, a review of current joint and service doctrine must ensure all general engineering requirements are available to our combatant commanders.

Doctrine

The issue of doctrine has always perplexed the services primarily because it is one of the last matters attended to after numerous reviews over a period of time. In this particular case, the service engineers have several joint engineering publications in place. Two of them specifically refer to either engineer operations (JP 3-34, Joint Doctrine for Engineer Operations) or civil engineering support (JP 4-04, Joint Doctrine for Civil Engineering Support). These two

documents are a valuable source of information for the joint officer; they are a starting point regarding civil engineering or construction engineering issues. They provide the necessary baseline for each service to see how the other services operate.

Engineer senior leaders from each service must now open a dialogue to improve overall jointness within the joint engineer community by developing a common joint engineer vision and common concept of operations. It will take some time to fully develop certain operations, but construction engineering is based largely on standard construction techniques utilized daily in military or civilian construction. Once senior leaders set the vision, the respective service engineers can work toward a joint design that will fully integrate all engineers – enlisted, warrant officer, and commissioned officer.

The first attempt at facilitating a joint engineer school came in 2006 at Ft Leonard Wood, Missouri. This school responded to an urgent need to train combat engineers in the use of tools to defeat or neutralize Improvised Explosive Devices (IED) and in the use of Mine Protected Vehicles to counter the proliferation of IED attacks in Iraq since mid-2004. Soldiers, Marines, and Sailors received training, but only after they had been designated as a future Route Clearance Team preparing for deployment. This was a great start in training jointly for a specific mission set. But a lot more work needs to be done: All construction engineer officers, warrant officers, and enlisted service members should be trained at the same facilities on the same equipment, using joint doctrine.

Currently, all the services train their officers and warrant officers at service specific schools. The next step in the evolution of joint engineers is to conduct service-related schooling espousing specific service-related requirements and then to attend joint schooling, where all engineer Soldiers, Marines, Airmen, or Sailors can validate their engineer credentials. This school will teach a specific curriculum to all the students using joint faculty to teach the joint doctrine. With a fully integrated training facility and student base, the foundation for joint engineers will be laid to meet future challenges.

Enlisted service members conduct basic training at service-specific locations. Upon graduation, they learn their engineer military occupational specialties including carpentry, plumbing, electrical, and heavy engineer construction equipment at different locations, including Ft Leonard Wood, Missouri; Sheppard Air Force Base, Texas; and Gulfport, Mississippi. This training has been conducted since 2001 at these locations, but each training facility has its own service detachment and administrative chain of command for everything other than the specific specialty training. The next step is to standardize the training so that a Seabee plumber is trained identically to a Soldier.

Current joint doctrine is available for construction engineers. Implementation of the doctrine and schooling and training of engineers at one location using a joint cadre, joint doctrine, and the same facilities is the next step. Service stovepipes and parochial interference are hampering a great opportunity to improve the construction engineer field. Strategic leaders want engineers that can accomplish a specific set of tasks to standard. We now have an opportunity to train engineers in a specific organization to accomplish that task. The color of engineers' uniforms should not matter. Concurrently, the general engineering community must standardize its equipment.

Equipment

Engineer construction equipment is the same in the military as in the commercial environment except for the paint schematic and some required military specifications such as tie down points and blackout drive capability for operations during limited visibility. However, the current models of the “big three” pieces of heavy engineer construction equipment are older than the Soldiers, Airmen, Sailors, or Marines operating them.¹⁶ These dozers, scrapers, and road graders were all purchased for the Army between 1984 and 1986 during President Reagan’s military buildup. The D7F and D7G model dozers operate by pulling levers and pedals to pivot the dozer; they are no longer produced by Caterpillar so a specific program, the Service Life Extension Program (SLEP) located at specifically designated Caterpillar sites, now restores the dozers to a like-new status.¹⁷ State-of-the-art dozers, scrapers, and road graders have incorporated modern technology into the operator compartments, dramatically reducing manipulation of numerous levers, throttles, and knobs into a joy-stick design. Young soldiers who grew up playing Nintendo use this technology effortlessly. A dozen other military construction pieces are similarly lacking modern technology. Only two pieces – the hydraulic excavator and the new heavy front-end loader currently in production for delivery in 2007 have a modernized operation cab utilizing current joy-stick technology.

To build a truly joint engineer force, we must train our Soldiers to perform the same tasks and use the same equipment. Common engineer equipment facilitates joint engineer training. The services initiated a common plan in 2001 to train enlisted engineer construction military occupational specialties (MOS) from the Army, Navy, Air Force, and Marines at locations including Fort Leonard Wood, Missouri; Sheppard Air Force Base, Texas; and Gulfport, Mississippi during Advanced Individual Training. Current training remains a key means for “purpling” the engineer soldier. One obvious drawback is the variety of commercial equipment on site for training all heavy equipment operators at Ft Leonard Wood. Commercial

construction equipment from Caterpillar, John Deere, Case Holland, Champion, and International are lined up in rows for training. Consider the road grader: There were three different types of road graders at the training site so the Navy trained on the Champion, the Army on the Caterpillar, and the Air Force the John Deere.¹⁸ Not only was the training disjointed at the training base, it reinforced the current differences in construction unit design. Without a common chassis the military loses time and productivity learning to operate a variety of road graders with different operating consoles and capabilities. Interoperability is lost because of variations of console and cab layouts; these variations degrade the skills required for road construction operations. Currently, the service engineers do not exchange equipment because of such differences. Consider what happened in Afghanistan in early 2002: Navy Seabees provided initial engineer support. Thirty days later the Marines and Seabees were relieved by an Army brigade with Army construction engineers, so the Navy's construction equipment redeployed out and the Army deployed its package in. If the Army and Navy used the same equipment, transition would have been easy. As it was, an expensive and cumbersome air lift was needed to get the Navy out and bring the Army into the area of operations.¹⁹

In addition to using different commercial types of construction equipment, the need for multiple repair parts increases the burden on an already overtaxed repair parts system. Instead of maintaining key parts in sufficient quantities to keep the fleet operationally ready, the four services buy four different types of repair parts for their fleets without the opportunity to exchange repair parts through the maintenance support system.²⁰ Therefore, an Army construction battalion in Baghdad cannot assist a Naval Mobile Construction Battalion in Falluja with a critical repair part. Repair parts are shipped from the United States or the nearest commercial vendor. If all engineers used the same equipment from the same commercial vendor, the engineer logistics footprint would be significantly reduced – vastly improving a major goal of the joint force and specifically the Focused Logistics tenant.²¹

The first step in the process of getting all engineers to use a common platform is to determine service requirements and agree on the indispensable requirements so that commercial corporations can prepare a suite of vehicles to compete for the contract with the U.S. military. An example of this competition would be a vendor preparing a “family” or suite of vehicles for contract competition that fulfilled essential requirements, such as blade width, blade articulation, and transportability in a U.S. Air Force airframe without removal of the cab and rollover protection. After the contract selection process was completed, the winning company could provide the “family” of vehicles for purchase by the services. This would eliminate service

parochialism; all services would use a common platform configuration, the same operators control panel layout, and the same replacement parts. COL Tim Goddette, Program Manager, Force Projection at Tank and Automotive Command, stated in a telephone interview that until the services can determine the correct force ratio and the specific set of required construction tasks for their equipment, each service will continue to solicit bids for their equipment requirements and nothing will be standardized.²²

The second step would bring the services to collaborate on budgets, using “economies of scale” to procure the mutually agreed upon equipment over the same time period. Each service should procure major equipment in groups. Thus, for example, the dozer, road grader, and scraper would be key procurements within the same years of production over one budget cycle. This reduces the overall cost of procurement through “economies of scale” purchasing and nudges the engineer construction organizations closer to a joint organization.

Currently, the three services individually request funding for construction equipment in their respective service budgets. Not only do these efforts detract from the overall requirement by bringing smaller line requests into the service budgets, but Congress does not appreciate the overall engineer equipment status and operational readiness because of the piecemeal effect. Therefore, these small line requests in an overall Defense budget are often overlooked. Unfortunately, each service operates on restricted budgets. Given the current operational tempo, construction engineer equipment does not warrant significant funding levels in the current year budget (FY07). The first significant funding to replace the “big three” engineer pieces is proposed in the current Army budget, which allocates to \$238M dollars for purchases of large construction equipment, as stated in the Program Objective Memorandum 08-13 (POM).²³ Although these are the first real dollars identified in a funding document to replace the current 23-year old fleet, it only scratches the surface regarding the number of pieces of equipment requiring replacement. Additionally, the other services’ requests for this equipment have been decremented in their service budgets as well, so replacement of their construction equipment will not occur until after 2013. Because all services now share a common need for heavy construction equipment, we have a great opportunity to merge equipment requirements and properly prepare the budget requests to ensure the dollars are available when required to buy critical construction equipment.

Equipment procurement and standardization will be the hardest piece to accomplish in merging into a single general engineering organization. This equipment is not headline equipment, unlike a newly designed helicopter or armored vehicle, but it is essential for missions we are currently dealing with in theater today. We must procure, train, and use the

same equipment to benefit multiple economies of scale in purchasing, repairing, and common training packages. The next step is to include the largest resource in the general engineering organizational structure in each step of the dynamic process of unifying our military construction capabilities.

Reserve Component Construction Engineers

Reserve engineers in the Army, Navy, USMC, or the Air Force, or the Army National Guard provide critical construction engineering capabilities to the total force both in time of war and in peace. These engineers often are civilian engineers. They constantly hone their carpentry, plumbing, electrical, and heavy equipment operator and mechanical skills as they work in large city governments, private construction companies, or public utilities. Companies like Caterpillar, John Deere, Consolidated Edison, and home builders like Toll Brothers and Pulte have thousands of employees who are citizen-soldiers.

Since in the current force structure 68% of construction engineers are in the reserve component, the mobilization rules become critical, along with issues in service structures. The Army and the Navy maintain significant personnel and equipment in their structures, primarily located in states bordering the Atlantic and Pacific Oceans and the Gulf of Mexico. As we know, the state of Louisiana was struck by Hurricane Katrina in August 2005. Parts of two construction engineer battalions from Louisiana were deployed at the time in support of operations in Iraq and Afghanistan. Not only were the soldiers away from their families when this catastrophe occurred, but the construction equipment essential to local and state government response was deployed in Iraq and Afghanistan. Local authorities complained about this issue, although there were many other issues at a higher priority. However, in many cases reserve component units' equipment is specifically identified as Stay Behind Equipment (SBE) or Theater Provided Equipment (TPE), so it is left in Iraq or Afghanistan for use by any engineer organizations assuming the next mission. Thus, the reserve component units return with their soldiers, but the majority of their construction equipment is not available for several years until it is reconstituted, refitted, or replaced as funds become available.

Navy Seabees, predominately located near large naval facilities, are dealing with similar situations. All twelve of the reserve NMCB's have been mobilized with a majority of the units deployed abroad.²⁴ New mission requirements are being filled with cobbled-together platoons or companies. One advantage the Navy has is a shorter deployment cycle than the Army's. The Navy deploys on seven-month deployment cycles which precludes extremely long tours.

But this causes concern with private employers due to faster follow-on rotations within the allotted mobilization.

The reserve component construction engineers are essential in current operations. Their skills are often unmatched, and support for them in their home states brings instant credibility to the military. Following this review of doctrine, equipment/structure, and reliance on the reserve component for the general engineering mission, the future resides with senior leaders' decisions. The Joint Staff in the Pentagon is currently analyzing the feasibility of developing a joint engineer capability.

Ongoing Joint Staff Activities

In joint doctrine, the engineers reside in the J4 Logistics. The current J4, LTG Christianson charged the Chief of Engineers, LTG Strock in early 2006 to develop a methodology to show how a new strategy using Capabilities-Based Methodology (CBM) will translate the "capabilities-based approach" into programmatic through a top-down process for force planning over the next 15-20 years. This Concept Development and Experimentation (CD&E) will be used to design future joint capabilities for acquisition planning. This J4 action specifically targeted one of the major tenants of the J4 mission: "maximize the logistics capabilities of the combatant commands, to include developing . . . civil engineering, and sustainment policies and procedures to support combat forces."²⁵ The first approved capability area chosen for review was the "joint engineer" capability; this review focused specifically on construction engineering because it involves all four services, unlike combat engineering, which involves only the Army and the USMC. The three-axis-process²⁶ starts in Axis I by aligning functions and leadership. This reveals that construction engineers provide full-spectrum support and then reveals how each service aligns its engineer capabilities. In Axis II, transformation provides an interdependent joint force. A precise splitting of joint doctrine between combat engineering and construction engineering ultimately reveals duplicative service functions and structure. Finally, Axis III uses the Joint Capabilities Integration and Development System (JCIDS) and capability- based process to show that joint strategy has not been developed by service engineers. Once this is evident, joint solutions will be developed. Then the paradigm of each service needing its own construction engineer force is no longer valid. This analysis validates a great opportunity for building a truly "joint engineer" corps that is versatile, adaptable, and trained to perform all construction engineer tasks. Additional benefits include a critical review of the current force structure and determination of whether the active component/reserve component ratio is appropriate, review of the required capabilities, and a

proposal for construction engineer equipment acquisition and budget preparation, and development of a joint school.

The analysis of engineer doctrine, equipping, and reserve component mix reveals a great opportunity to push hard to merge the services' construction engineering capabilities into a truly joint construction engineer force, amalgamating the current four service organizational structures. The following specific recommendations can facilitate establishment of a purple construction engineering force.

Recommendations

The following recommendations to integrate the construction engineer military occupational specialties and organizations from the four services and truly make one joint engineer force will be viewed by many as unattainable. But, a bold, innovative, and unselfish initiative to transform the current old, heavy, cumbersome, and predominately reserve component force into a dynamic joint force is exactly what visionary leaders must grapple with. Do we really want the 21st century Pentathelete engineers? Engineers are capable of accepting all the challenges of being a military service member first, but a highly trained, adaptable, smart, dedicated engineer a close second.

- 1) The senior engineer from the Army, Navy, Marine Corps, Air Force, and the respective senior Army National Guard, Reserve, Naval Reserve, and Air Force Reserve should conduct a series of conferences to consider merging all construction engineer organizations into one formation trained, equipped, and organized to conduct any mission directed by the Office of the Secretary of Defense, the Joint Staff, or specific service component commanders. The service proponent of the merged organization must orchestrate the Active, National Guard, and Reserve structures identically.
- 2) The first step in this process is to standardize the number of military personnel and equipment in a company and battalion/squadron configuration. Smaller, leaner organizations with complete self deployment capability and transportation assets are a requirement. Following design of a smaller standard unit, additional unit structure will be available to increase the number of units in the structure.
- 3) The Active and Reserve Component mix of units must be thoroughly analyzed. With over 70% in the current aggregate in the Reserve Component, senior leaders have virtually insurmountable challenges to provide construction engineering support to current operations. A smaller organization design will increase the number of units overall, but future analysis of all the requirements currently facing the four service

construction engineer organizations must be accomplished to determine the correct Active/Reserve Component mix of the combined organization of the future.

- 4) Upon determining organizational structure (personnel and equipment), immediately integrate the new design by implementing it into the next Program Objective Memorandum (POM). Each service must request necessary funding to replace construction engineer equipment that is in excess of 15-years-old. Each service must abide by and strictly enforce the mutual agreement of purchasing the commercial vendor equipment selected through the joint acquisition process. The major end items must be procured under a “Family of equipment” design. In future year planning, all money must be placed in the POM under one service entry.
- 5) Doctrine should immediately defer to current joint doctrine. Future joint doctrine should include robust representation from each service for a minimum of five years until a complete merger of structure has occurred.
- 6) Military schooling for the construction engineer specialties must continue as it is. Enlisted personnel should undergo the same Initial Training required by their respective services for a period not to exceed 12 weeks. Advanced Individual Training should be trained at Ft Leonard Wood, Missouri until specific specialties are determined. Training in specialties should continue at the current respective training sites; additional training sites for heavy equipment operations should be provided to accommodate increased demand for these specialists. Enlisted engineers from the reserve components must complete the stringent requirements required of the active component. Enlisted engineers in the grade of E-6 and above must be licensed in their technical field for advancement.
- 7) Military schooling for officers should begin at the respective service schools. Initial training should not exceed 12 weeks. An engineering aptitude test must be successfully completed to qualify for further training to become a joint engineer construction officer. To qualify for admission to the Joint Engineer Training Course, candidates must have earned a Bachelor of Science or higher degree in engineering, engineering management, surveying, or architecture. Training will be conducted for all applicants at one location. Engineer officers from the reserve components must meet the same stringent requirements. All officers attaining the grade of O-4 and above must be a licensed engineer or architect through the current board certification process conducted within each state.

Conclusion

Consolidation of the Army's Combat Heavy engineers, the Navy's SEABEES, the Air Force's RED HORSE, and the Marine Corps construction engineers will occur only if bold, innovative senior engineers from the services look to the future and envision the importance of merging these units to strengthen our military. Separate service construction engineers that conduct similar operations require enormous funding to maintain the world's largest construction company. Unfortunately, funding will not be available to replace aging heavy equipment in all services' inventories. Construction engineers can complete major construction projects, perform wartime reconstruction, and provide disaster relief in ways that other Soldiers, Sailors, Airmen, and Marines can only admire. The true vision of a joint engineering community, shared by previous senior leaders, will actualize only if the engineer community decides to break current paradigms within this specialized group. They can agree to merge and thus strengthen the U.S. military or they can continue to operate as autonomous stovepipe organizations, performing similar missions with dissimilar equipment, wasting valuable monies, and risking obsolescence.

Endnotes

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